



SHELTON BOARD OF EDUCATION

382 Long Hill Avenue, Shelton, CT 06484

Tel (203) 924-1023

Fax (203) 924-8057

www.sheltonpublicschools.org

Dr. Christopher Clouet
Superintendent of Schools

Gavriela Ziu-Pires
Interim Supervisor of Teaching and Learning-STEM

Dear Students and Guardian(s),

According to research, students lose about 2.6 months of learning in mathematics over the summer. This phenomenon, also known as summer slide, can cause students to start the new academic year with a lower achievement level than where they left off at the closure of the prior year. Most importantly, researchers identify long-lasting effects from summer loss related to lower self-confidence, as well as success in school and college.

The Shelton Public School System has developed a Summer Math Challenge that can easily integrate into your summer plans. The program is designed to be developmentally appropriate for your student based on the grade level they will be entering for the 2019-2020 school year. We recommend scheduling time for your learner(s) to participate in this program.

The importance of spending time with family and enjoying the outdoors also provides valuable learning opportunities. Involvement in authentic experiences allow learners for knowledge transfer beyond the classroom and vice versa. Many daily scenarios provide opportunities for problem solving and reasoning, such as estimating time and cost of travel, doubling ingredients in family recipes, planning and budgeting for home projects, probability in sports and playing board games.

Specific Grade Summer Math Challenge for students in grades K-12, can be found at www.sheltonpublicschools.org under the Teaching and Learning tab.

We hope that you will participate in this year's summer math challenge and help our learners in maintaining and improving their math skills, as well as further develop their confidence in math during the summer.

Gavriela Ziu-Pires

Gavriela Ziu-Pires
Interim Supervisor of Teaching and Learning-STEM

AP Calculus Review Worksheet

This packet is a review of the entering objectives for AP Calculus and is due on the first day back to school. It is to be done neatly and on a separate sheet of paper. Have a great summer!

I. Simplifying Rational Expressions

Simplify. (Show your work!)

1. $\frac{x-4}{x^2-3x-4}$

2. $\frac{x^3-8}{x-2}$

3. $\frac{5-x}{x^2-25}$

4. $\frac{x^2-4x-32}{x^2-16}$

II. Trigonometric Identities

1. Pythagorean Identities

2. $\cos 2x =$ _____

3. $\sin 2x =$ _____

III. Operations with Rational Expressions

1. $\frac{1}{x+h} - \frac{1}{x}$

2. $\frac{\frac{2}{x^2}}{\frac{10}{x^5}}$

$$3. \quad \frac{\frac{1}{3+x} - \frac{1}{3}}{x}$$

$$4. \quad \frac{2x}{x^2 - 6x + 9} - \frac{1}{x+1} - \frac{8}{x^2 - 2x - 3}$$

IV. Solving equations

Solve for Z

1. $4x + 10yz = 0$

2. $y^2 + 3yz - 8z - 4x = 0$

V. Operations with functions

If $f(x) = \{(3,5), (2,4), (1,7)\}$ $g(x) = \sqrt{x-3}$ $h(x) = \{(3,2), (4,3), (1,6)\}$
 $k(x) = x^2 + 5$ determine the following:

1. $(f+g)(1) =$

2. $(k-g)(5) =$

3. $(f \circ h)(3) =$

4. $(g \circ k)(7) =$

5. $f^{-1}(x) =$

6. $k^{-1}(x) =$

7. $\frac{1}{f(x)}$

8. $(kg)(x) =$

VI. Miscellaneous: Follow the directions for each problem.

1. Evaluate $\frac{f(x+h) - f(x)}{h}$ and simplify if $f(x) = x^2 - 2x$.

2. Expand $(x+y)^3$

3. Simplify: $x^{\frac{3}{2}}(x+x^{\frac{5}{2}}-x^2)$

4. Eliminate the parameter and write a rectangular equation for

$$x = t^2 + 3$$

$$y = 2t$$

VII. Series

Expand and simplify.

1. $\sum_{n=0}^4 \frac{n^2}{2}$

2. $\sum_{n=1}^3 \frac{1}{n^3}$

VIII. Simplifying Expressions

Simplify.

1. $\frac{\sqrt{x}}{x}$

2. $e^{\ln 3}$

3. $e^{(1+\ln x)}$

4. $\ln 1$

5. $\ln e^7$

6. $\log_3\left(\frac{1}{3}\right)$

7. $\log_{\frac{1}{2}} 8$

8. $\ln \frac{1}{2}$

9. $e^{3\ln x}$

10. $\frac{4xy^{-2}}{12x^{\frac{1}{3}}y^{-5}}$

11. $27^{\frac{2}{3}}$

12. $(5a^{\frac{2}{3}})(4a^{\frac{3}{2}})$

13. $(4a^{\frac{5}{3}})^{\frac{3}{2}}$

14. $\frac{3(n+1)!}{5n!}$

IX. Using the point-slope form $y - y_1 = m(x - x_1)$, write an equation for the line

1. with a slope of -2, containing the point (3,4)

2. containing the points (1,-3) and (-5,2)
3. with slope 0, containing the point (4,2)
4. parallel to $2x-3y=7$ and passes through (5,1)
5. perpendicular to the line in problem #1, containing the point (3,4)

X. Trigonometry

Without a calculator, determine the exact value of each expression.

1. $\sin 0$
2. $\sin \frac{\pi}{2}$
3. $\sin \frac{3\pi}{4}$
4. $\cos \pi$
5. $\cos \frac{7\pi}{6}$
6. $\cos \frac{\pi}{3}$
7. $\tan \frac{7\pi}{4}$
8. $\tan \frac{\pi}{6}$
9. $\tan \frac{2\pi}{3}$
10. $\tan \frac{\pi}{2}$
11. $\cos(\sin^{-1} \frac{1}{2})$
12. $\sin^{-1}(\sin \frac{7\pi}{6})$

XI. Domain and Range

For each function, determine its domain and range.

1. $y = \sqrt{x-4}$
2. $y = \sqrt{x^2-4}$
3. $y = \sqrt{4-x^2}$
4. $y = \sqrt{x^2+4}$

XII. Determine all points of intersection

1. $y = x^2 + 3x - 4$
 $y = 5x + 11$
2. $y = \cos x$
 $y = \sin x$ in the 1st quadrant

XIII. Solving equations

Solve for x , where x is a real number. Show your work.

1. $x^2 + 3x - 4 = 14$
2. $\frac{x^4 - 1}{x^3} = 0$
3. $(x - 5)^2 = 9$
4. $2x^2 + 5x = 8$
5. $(x + 3)(x - 3) > 0$
6. $x^2 - 2x - 15 \leq 0$
7. $12x^2 = 3x$
8. $\sin 2x = \sin x$, $0 \leq x \leq 2\pi$
9. $|x - 3| < 7$
10. $(x + 1)^2(x - 2) + (x + 1)(x - 2)^2 = 0$
11. $27^{2x} = 9^{x-3}$
12. $\log x + \log(x - 3) = 1$
13. $e^{3x} = 5$
14. $\ln y = 2x - 3$